CBP OIT Wireless Systems Program Office (WSPO)

Broadband Wireless Technology Demonstrator

May 24, 2011

U.S. Customs and Border Protection

Technology Demonstrator

- Background
- Introduction
- Next Generation Tactical Broadband Vision
- Broadband Devices and Services
- Demonstration Details

Background

- **DHS operates and maintains several Land Mobile Radio (LMR) networks.**
  - More than 120,000 DHS operational users, rely on these tactical communications (TACCOM) LMR radios for communications lifeline and is critical to their safety, and success of their missions and operations

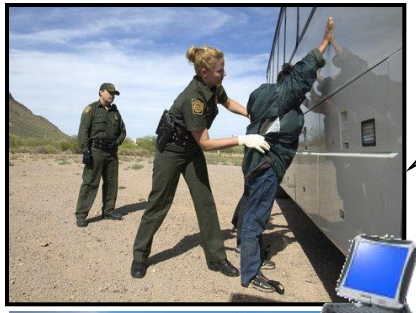
- **Legacy land mobile radio (LMR) systems present several immediate operational shortcomings**
  - Many systems are past their service lifecycle
  - Inadequate coverage, capacity, and encryption for today's mission
  - Many do not meet Federal narrow-banding mandates and Project 25 (P-25) Interoperability standards

- **Current TACCOM approach meets immediate needs but :**
  - Does not address new mission needs for tactical voice, data & video
  - LMR spectrum scarcity
  - Interoperability and Operational challenges (complexity)
  - Expensive lifecycle cost (own and operate model with no cost sharing across broad communities)

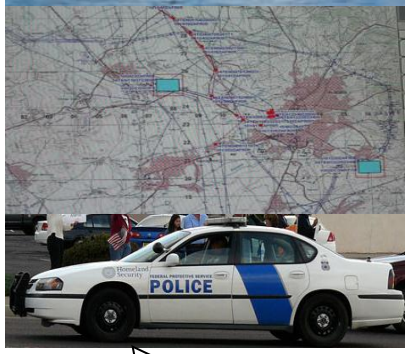
Introduction

- **The next generation of TACCOM systems must provide broadband capabilities, leverage existing systems and investments to reduce life cycle cost, simplify operations, and extend coverage to meet operational need**

Vision of Next Generation Tactical Wireless Broadband Operations



Streaming Video



Geospatial Location

Situational Awareness

Communications with Central Dispatcher

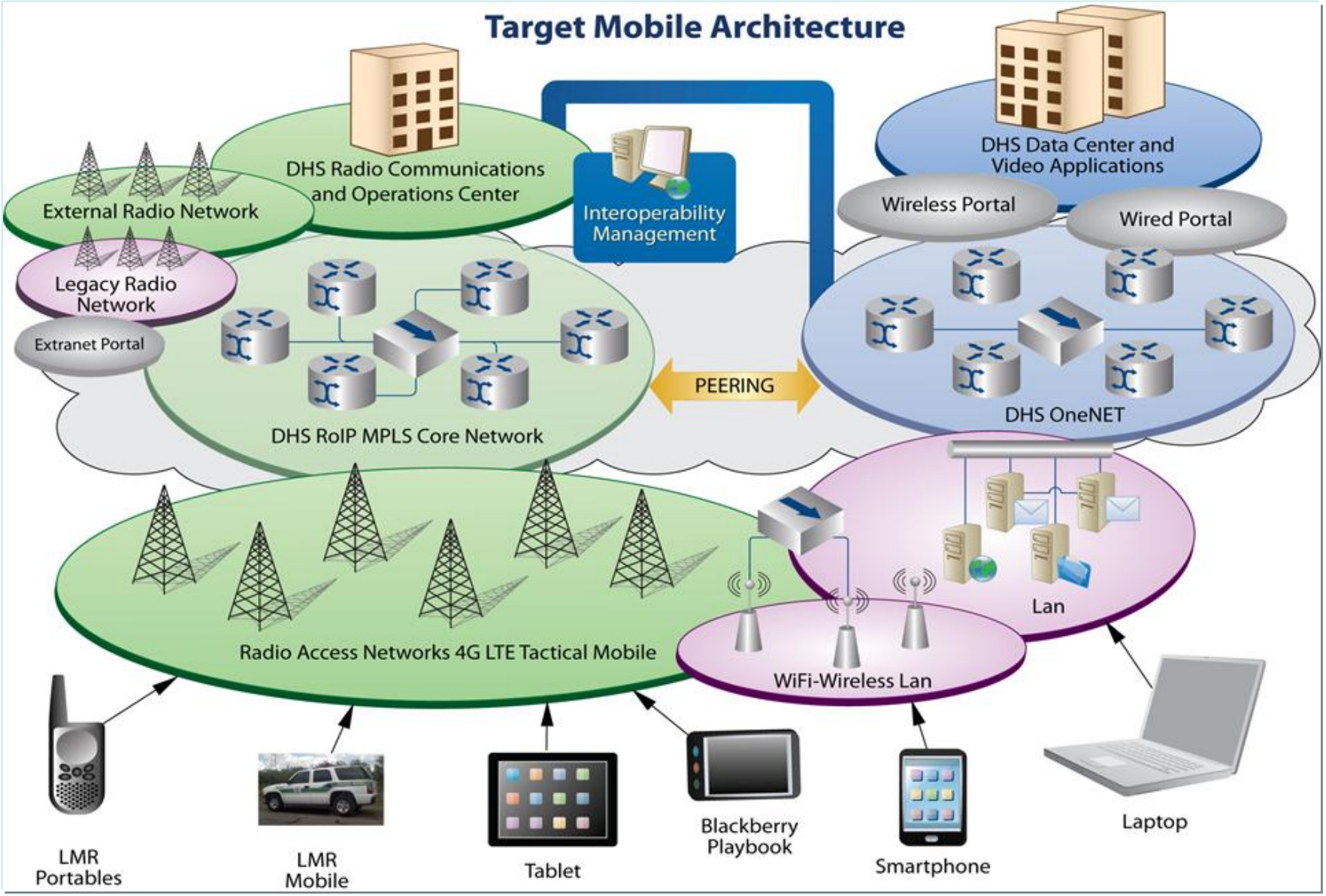
Unmanned Aerial Vehicle Feeds

Common Operating Picture

Voice and data communications

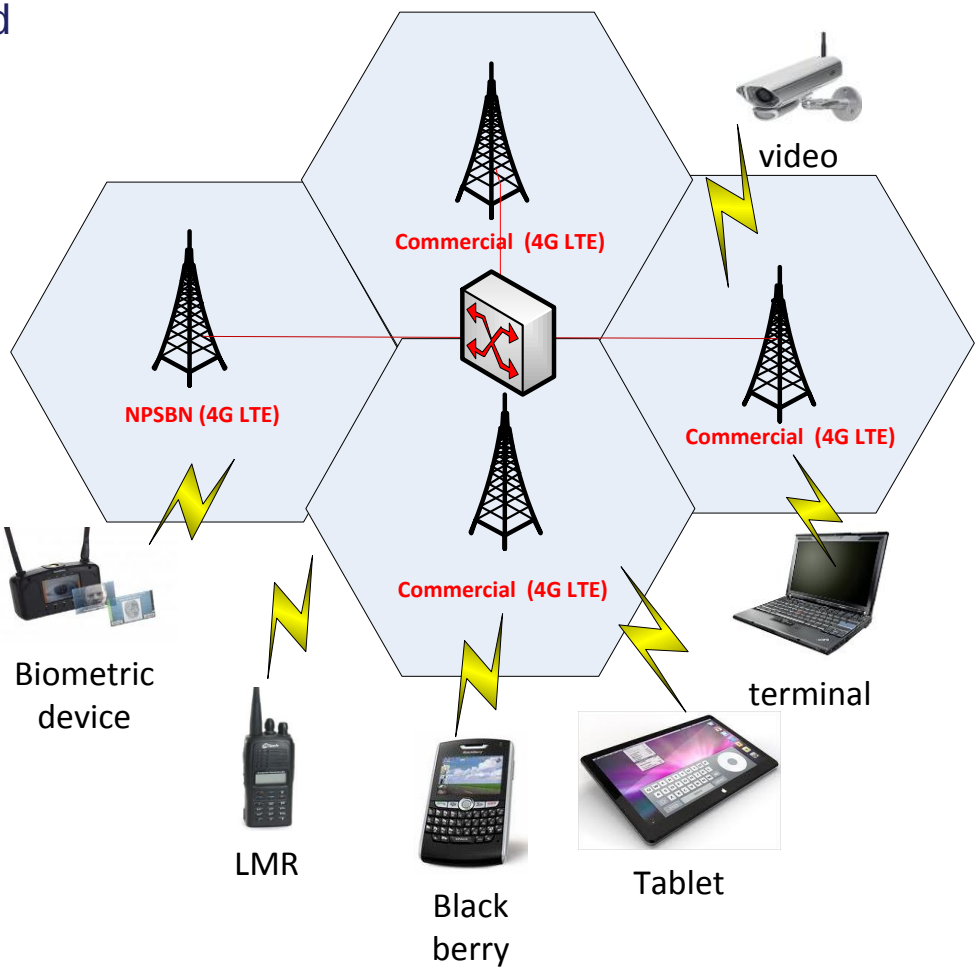
Tactical wireless broadband provides a unique opportunity for migrating federal law enforcement and local public safety into an emerging voice/data broadband technology

Next Generation Notional Target Architecture



New "Game Changer" Approach

- Shift from government owned and operated to subscription-based service on national public safety broadband network (NPSBN) primary and commercial cell broadband network secondary
- Obtain mission-required higher grade service from commercial providers for tactical use
- Spread costs over broad user base; enables use of potentially lower cost commercial devices and ecosystem
- Support a variety of subscriber devices operating over 4G-LTE networks, LMR networks or direct voice radio-to-radio (no network)



Approach improves interoperability, increases capability while reducing lifecycle costs by sharing networks over a wide user base

Transition Timelines

Transition from stove piped government-owned and operated narrowband voice to commercially-provided broadband (LTE) voice and data services

Migrate to Public Safety networks as they become available

- Similar approach that vendors use when phasing in 4G service

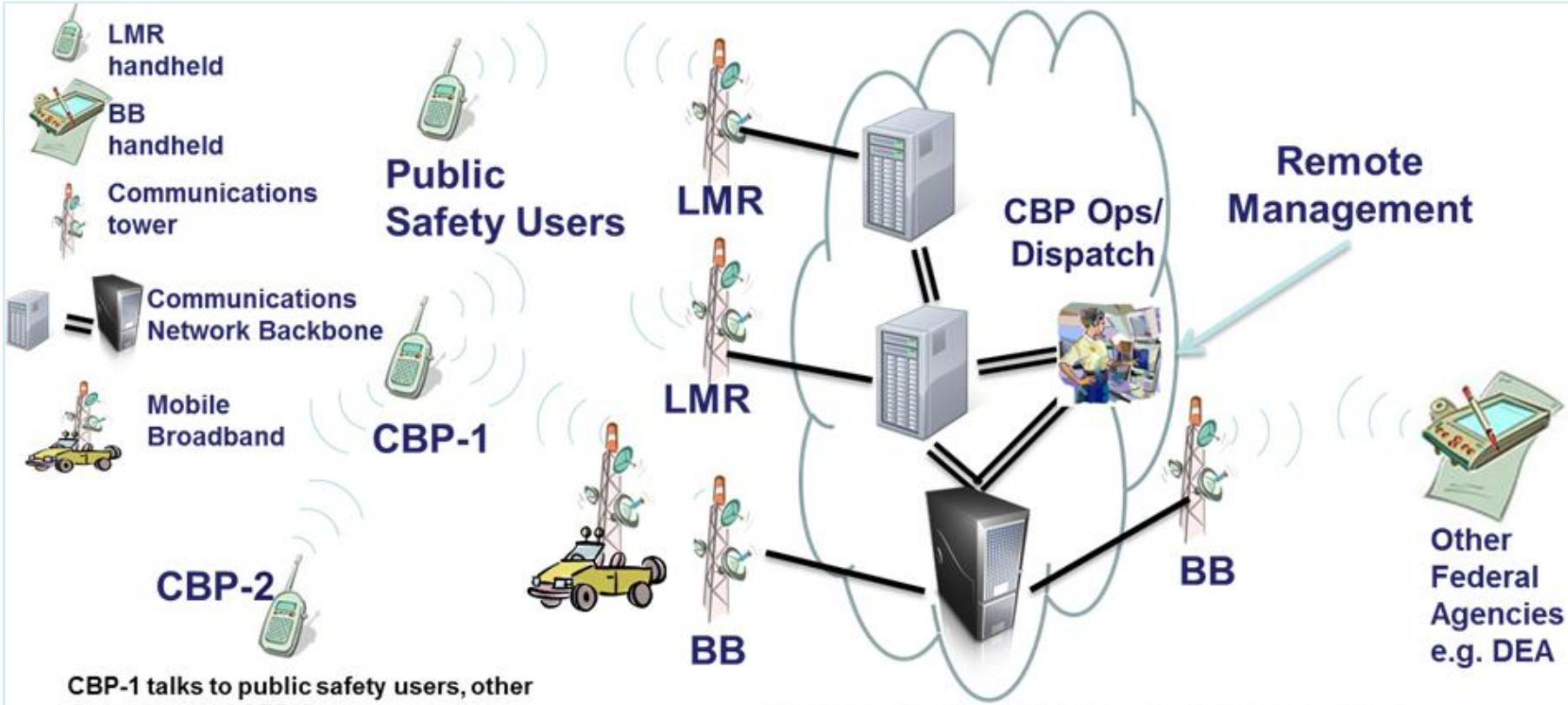
End state will be use of Public Safety (Primary), Commercial as back-up

- Radio-to-radio (traditional LMR) will be used for emergency (i.e., no infrastructure)

Propose a "premium" grade of service to deliver assured services

- Low latency, highly reliable and secure communications

Next Generation Tactical Wireless Broadband Vision



CBP-1 talks to public safety users, other Agencies, and CBP-2

- Communications initiated from either end
- Communications connect over LMR or BB
- CBP-1 talks to CBP- 2 without infrastructure

CBP-1 automatically switches between LMR and BB without losing connection to police or DEA

Ops/Dispatch controls OTAP and OTAR across all CBP devices

- Talk groups include non-CBP devices
- Coordinates encryption and talk groups with other agencies
- Manages application deployment

Operational Scenarios Examples (1)

Scenarios:

- Officer is doing an outbound check in a jet way and would like to determine if passenger has filed proper documentation (for example CMIR)
- Agent intercepts a group of five aliens in a remote area and needs to determine status and information
- Agent intercepts an aircraft at the airfield and needs to determine crew/passengers status and aircraft history
- Officer is doing inspections in a seaport environment and would like to access commercial information on shipments

Operational Scenarios Examples (2)

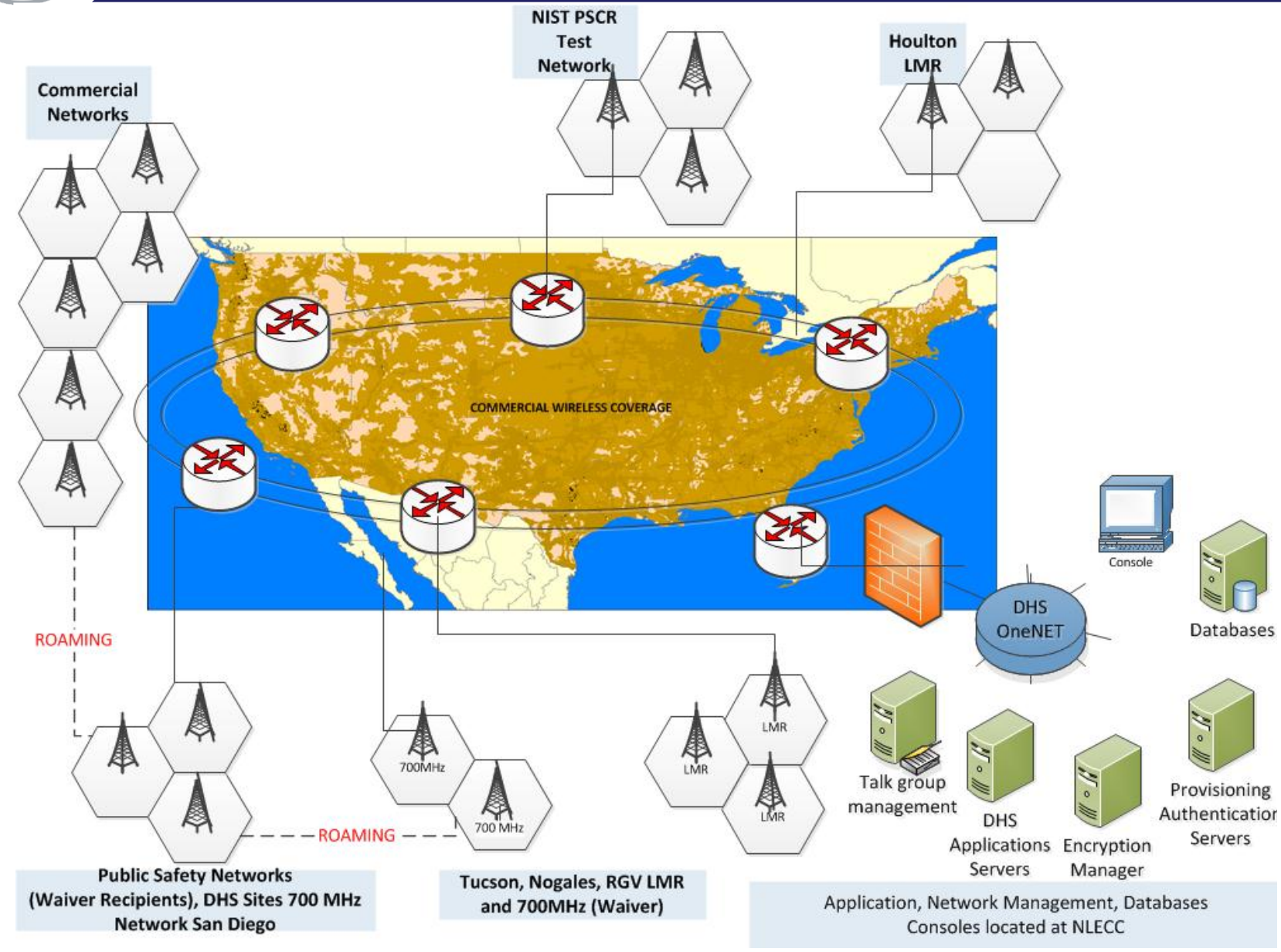
- Agent is conducting operations in a marine environment and requires actionable information on marine vessels and passengers
- Agent is conducting air operations in remote area and needs to maintain continuous voice communications for purposes of flight following and enforcement activities
- Agents are serving high risk warrants and need video feed from air support for tactical operations

Technology Demonstrator

- **Technology Demonstrator will be conducted to assess maturity of broadband voice, video and data technologies in the DHS tactical environment and will include:**
  - Proof of Concept Phase
  - Field Trials with Operational Users

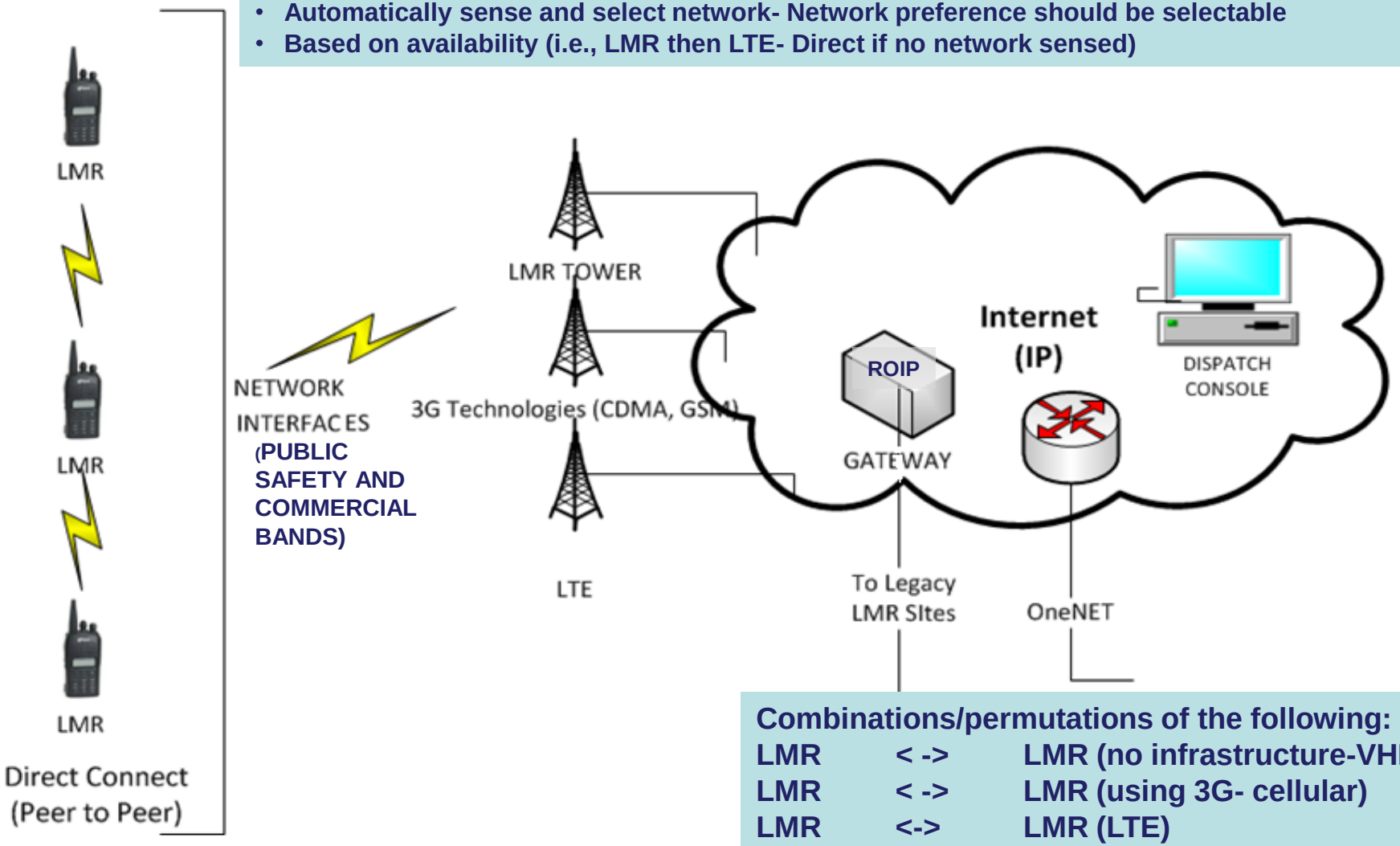
- **It will:**
  - Demonstrate “Mission Critical Grade” of service (secure, reliable, assured and highly available) leveraging commercial, private and public safety and technology, for improved efficiency operability and interoperability
  - Demonstrate seamless roaming across commercial and public safety integrating existing DHS LMR networks
  - Identify industry solutions that meet the Next Generation Tactical Wireless Broadband Vision, to include performance, cost, and schedule trade-offs
  - Assess how these market technologies address operator needs
  - Demonstrator prototypes will assist Operational Users to refine their requirements

Potential Demonstrator Network Architecture



Demo Objective 1: LMR Over Broadband

- Secure encrypted traffic, high grade of service, and assured connectivity and availability
- Automatically sense and select network- Network preference should be selectable
- Based on availability (i.e., LMR then LTE- Direct if no network sensed)



Multiple vendor LMR (P-25)
Motorola, Harris, Thales (others)

Combinations/permutations of the following:

LMR	< ->	LMR (no infrastructure-VHF)
LMR	< ->	LMR (using 3G- cellular)
LMR	<->	LMR (LTE)
LMR	<->	Dispatch
LMR	<->	LMR (Legacy non-P25)

Technology Demonstrator
Objective #1 – LMR over Broadband

Devices


Laptop (Toughbook)

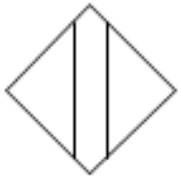

Video Camera


CELL Phone


Smart Phone


BioMetric reader


Digital Camera


SENSORS

Services

- Push to Talk (Law enforcement Grade- High availability)
- Encryption (AES)
- Configuration Management
- Database Connectivity (AFIS)
- Push/Pull SMS/MMS
- Images
- Streaming video
- Data pull (Sensor feeds)
- Email
- Applications (Incident reporting)
- File Transfer
- Location based services (Situational awareness)
- Device management and status

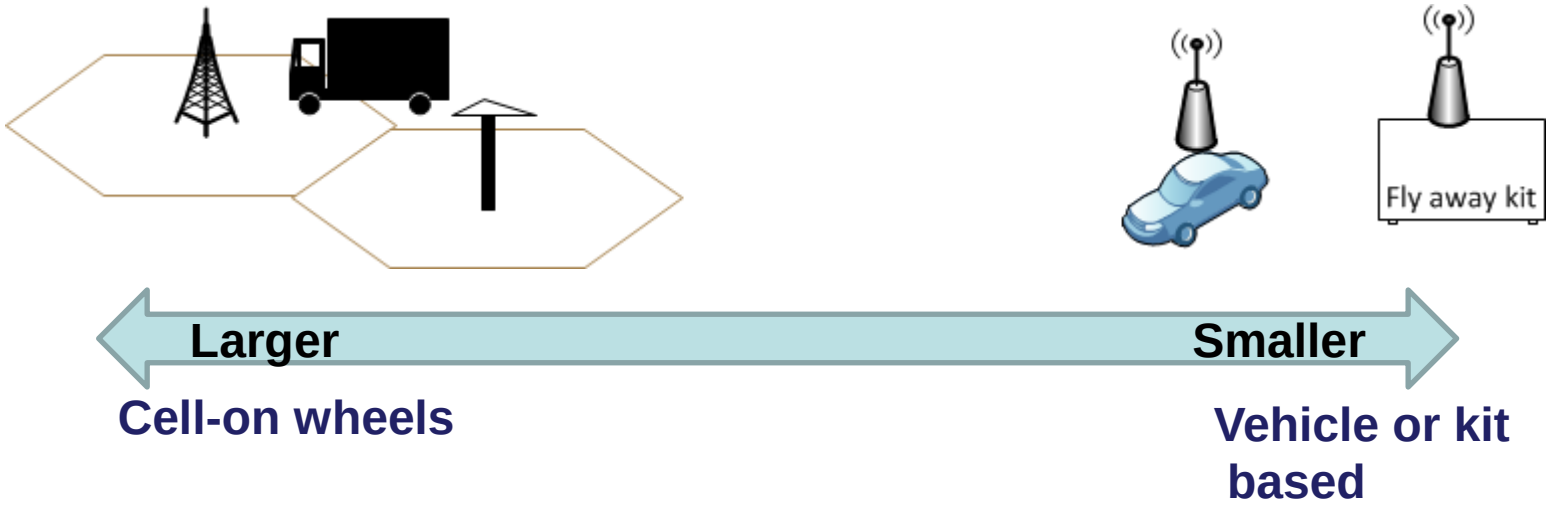
Objective 2: Radio and Key Management

- **Radio Management**
  - Authentication (control access to DHS network- security)
  - Presence and locations – track devices on network and status (location (GPS) and network (i.e., broadband or LMR), online/offline)
  - Programming
    - LMR and broadband device management by pushing configuration (code plug) and programming device through broadband connectivity
    - Push applications to device (Applications TBD)
  - Talk group management
    - Dynamically create talk groups and then push configuration (code plug) to end devices
  - Configuration management
    - Track device status (manage version of software, mobile applications, security settings etc.,)
- **Key Management**
  - Ability to rekey devices and track status (positive validation that key was received)
  - OTAR parameters should be conducted through the broadband interface
  - Ability to zero a compromised mobile

Technology Demonstrator
Objective #3 – Deployable Communications

- **Provide Deployable Communications Capability to service areas affected by disasters, emergency situations or out of range of available networks**
- **Solutions to address varied coverage requirements including:**
  - Large incident areas covering a wide area (size of several cells many square miles)
  - Local hot spots varying in size for small areas (similar to pico/femto cells areas)
- Solutions must connect to core infrastructure and public safety/commercial LTE networks (i.e., backhauled)

Examples of potential deployable standards based solutions



BACKUP SLIDES

Demonstration Objective 1:LMR over Broadband

LMR Over Broadband

Operations

- P25 radio designed to accept standardized broadband wireless modem
- P25 Radio capable of sending encrypted voice data either Direct, through LMR network or over broadband wireless network based on need and RF environment (i.e., network availability)
- P25 radio backwards compatible with legacy radios P25 radio designed to accept standardized broadband wireless modem
- Dispatch console center connected to distant users to provide support regardless if the users are connected via broadband or P25

Benefits

- Seamless transition from current state to future
- Maximizes the capability of leveraging existing commercial/private networks
- Supports operations by Direct mode when infrastructure is unavailable (lack of coverage or during disasters)
- Promotes interoperability by leveraging standardized commercial interfaces (i.e., LTE) and by being backward